

delphia, Ark., who is actively engaged in developing the fauna of Arkansas. The generic name is an abbreviation of the name of its native state.

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THE ANATOMY OF THE NAJAD HYRIDELLA AUSTRALIS (LAMARCK)  
(= DIPLODON AUSTRALIS).

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BY A. E. ORTMANN.

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Through the courtesy of Mr. L. S. Frierson, I have received the soft parts of a male and a female of an Australian Najad, *Diplodon (Hyridella) australis* (Lamarck) (see Simpson, Pr. U. S. Mus. 22, 1900, p. 890). Mr. Frierson obtained these specimens from Mr. William T. Bednall, who collected them in Gippsland, Victoria. I also received a shell which agrees well with specimens of this species represented in the Carnegie Museum collections. An examination of the soft parts revealed the following characters:

*Anal opening* (a) closed above by the connection of the inner mantle edges, without forming a supraanal opening. Closed part about four times as long as the anal opening, *forming a rather broad membrane between the outer mantle edges, and around the anal*. The latter is short, subcircular or slightly subelliptic, and *much shorter than the branchial opening* (only about one-fourth as long). It is separated from the branchial opening by the solid union of the inner mantle edges (m). Inner edge of anal practically smooth, that of the *branchial* (b) with distinct papillae, which stop suddenly in front, thus defining sharply the anterior end of this opening. There is no sign of a coalescence of the two mantle halves at this point. Farther in front, the inner mantle edge is smooth, and becomes indistinct anteriorly.

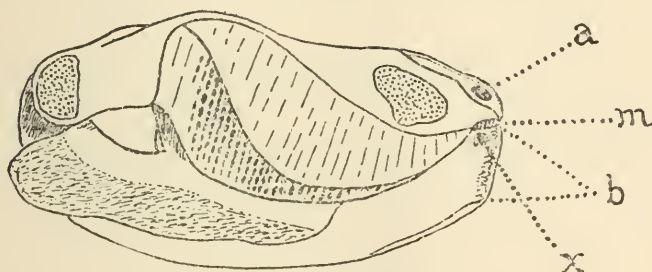
*Palpi* subtriangular, about as long as wide, with the posterior point not produced. *Posterior margins connected about half their length*.

*Gills* rather long and wide, the inner the wider, chiefly so anteriorly. Edge of inner gill with a longitudinal furrow, which is absent in the outer gill. Outer gill gradually narrower anteriorly, with its anterior end situated at the highest part of the mantle-attachment-line. Inner gill very slightly narrower anteriorly, with a broad anterior insertion occupying the whole space between the

anterior end of the outer gill and the posterior base of the palpi. However, this gill is not actually connected with the palpi, but its anterior end begins immediately behind the posterior end of the palpi.

Outer lamina of outer gills entirely connected with the mantle; inner lamina of inner gill entirely connected with abdominal sac. Posteriorly to the foot, the two inner laminae of the inner gills are entirely connected, thus forming a diaphragm completely separating the suprabranchial canals from the branchial cavity. This gill-

FIGURE 1.



Anatomy of *Hyridella australis* (Lamarck) (female). Side view of soft parts after removal of left half of mantle. *a*, anal opening; *b*, branchial opening; *m*, solid mantle connection between anal and branchial opening; *x*, hole by which the cloacal and branchial chambers communicate.

diaphragm does not extend entirely to the posterior margin of the mantle, and the posterior part of the diaphragm is formed by the bridge (*m*) which unites the two mantle margins and separates the anal from the branchial opening. *But there is a small median hole (x) between the posterior end of the gills and this bridge, connecting the cloacal cavity (and anal opening) with the branchial cavity.*

In all four gills of the male the two laminae are connected by very faint, distant, and often incomplete and interrupted septa, running in the direction of the gill-filaments. The outer gill of the female, and the most anterior and most posterior parts of the inner gill have the same structure; the rest of the inner gill of the female (its larger middle part) has marsupial structure (see figure), with strongly developed interlamellar connections. In the sterile female at hand, the solid parts are slightly elongated in the direction of the

gill-filaments, and stand in rows, forming interrupted septa and incomplete, intercommunicating water-tubes. Toward the base of the gill the interruptions are short and the interlamellar connections stand close together, resembling almost continuous septa. Toward the edge of the gill the interlamellar connections are more distant, showing a tendency to fall into transverse rows, but these are rather irregular, and in some places an almost reticulate appearance is presented.

The female examined is sterile, and thus nothing can be said about the eggs and glochidia. A slide, belonging to the same species, and kindly communicated by Mr. Frierson, shows vertical cross sections through the inner gill of a female, containing eggs, but no glochidia.

The rest of the soft parts offers nothing remarkable. The foot has a sooty-black color in its distal parts, sharply marked off from the whitish basal parts.

It is evident that this structure agrees to a remarkable degree with that of the South American genus *Hyria*, described previously NAUTILUS, 24, Jan. and Febr., 1911, pp. 108 and 114): In fact, practically all the essential features are identical. The South American genera *Diplodon*, *Castalina*, and *Tetraplodon* possess the same anatomy, except that in some of them we observe a tendency to form a mantle-connection in front of the brachial opening.

The only differences I am able to discover in the Australian form are: 1. The anal opening is much shorter and approaches more a circular outline, and, at the same time, the united mantle edges form a much broader membrane between the outer edges, and are broader around the anal, so that it is probable that the anal of the Australian species was capable of being stretched out as a tubular "siphon," much more pronounced than in the South American forms; 2. An unusual feature is the hole by which the cloacal cavity communicates with the branchial under the bridge, which separates anal and branchial openings. This hole is clearly seen in both of my specimens, and does not look like an accidental or abnormal condition. I have not seen anything like it in any South American form.

The connection of the posterior margins of the palpi probably is of no consequence; there is great variability in this feature in other groups.

It seems to me that the above differences are important. Of

course their existence in other Australian species should be confirmed. For the present, I think, it is well to separate the Australian form generically from the South American *Diplodon*, or, in other words, we should give to the subgenus *Hyridella* Swainson, 1840, generic rank. This is supported by the fact that *Hyridella* also differs in certain shell characters from the typical *Diplodon*, as has been recognized already by Simpson (l. c. p. 888).

One very important conclusion, however, is now finally established: Simpson's opinion that the Najades of the type of *Diplodon* (*Hyridella*) *australis* are closely related to certain South American forms (typical *Diplodon*), is fully justified, and there remains not the slightest doubt about this. The structure of the soft parts of both groups is so similar and so greatly different from the true *Unionidae* of the rest of the world, that *Hyridella*, no matter whether we regard it as a genus or a subgenus, must be placed with the family *Mutelidae* (?) and the subfamily *Hyriinae* (see NAUTILUS 24, March, 1911, pp. 129, 130). *This affinity is of the utmost zoögeographical importance.*

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MUSCULIUM DECLIVE, N. SP.

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BY V. STERKI.

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Mussel rather small, subequipartite, slightly to moderately inflated; beaks not or little anterior, somewhat prominent over the valve margin; the latter, anteriorly and posteriorly, straight or slightly curved, forming the two shanks of a rounded angle between the beaks, of about  $130^{\circ}$ , the posterior incline placed higher up than the anterior; balance of the outlines rounded without any angles in full-grown specimens; in half-grown and adolescent there is a short truncation at the posterior margin, at right angles to the longitudinal axis, and a similar one at the anterior, somewhat oblique; in young—post-nepionic—specimens, the posterior part of the mussel is shorter and higher than the anterior; surface glossy to waxy, with very fine (microscopic), sharp, crowded, concentric striae, and usually one or two lines of growth, and faint, irregular radial markings; shell thin, transparent to translucent; color light amber, to somewhat grayish or brownish in old specimens; hinge rather long;